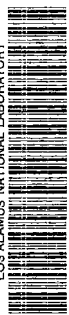


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COVER:

The substance shown in the cover photograph is moon dust, which was procured from the National Aeronautics and Space Administration for a joint experiment by scientists at the Los Alamos Scientific Laboratory and Knolls Atomic Power Laboratory. For more information read the story, "A Moon Dust Experiment," beginning on page one.

LASL Scientists Begin

A Moon Dust Experiment

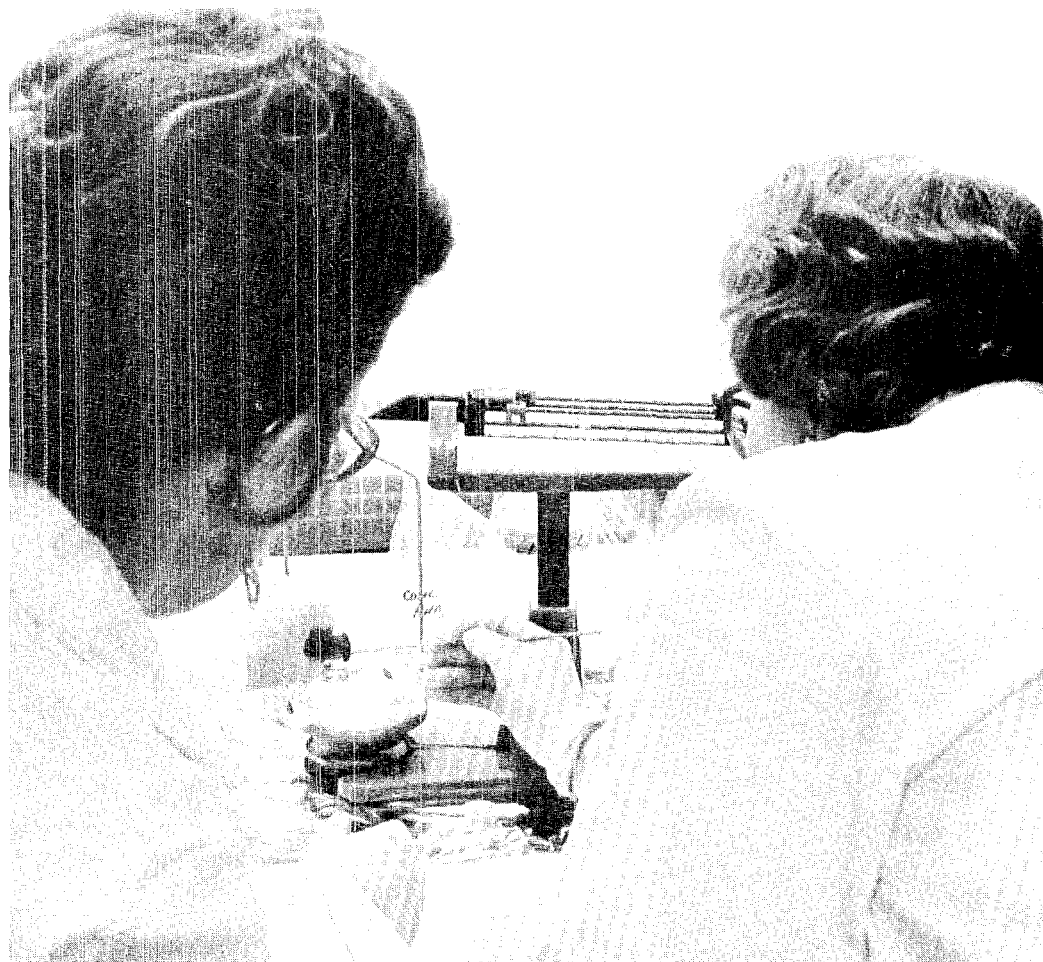
A small amount of moon dust—enough to fill a teaspoon—has arrived at the Los Alamos Scientific Laboratory for an experiment in conjunction with Knolls Atomic Power Laboratory in Schenectady, N.Y., to determine whether it contains any naturally occurring plutonium-244. The small sample is a part of the surface soil collected by Apollo-14 astronauts in January of 1971.

The experiment is another step in determining the origin of some of the heavy elements in our solar system. The first step was the discovery of naturally occurring plutonium-244 in bastnasite ore. This isotope was first known to man as one artificially created. The existence of naturally occurring amounts of it, although suspected, was not proven until mid-1971. Darleane Hoffman and Francine Lawrence, both of Group CNC-11, and scientists at KAPL made the discovery in an organic solvent concentrate provided by the Molybdenum Corporation of America from a bastnasite mine in Southern California.

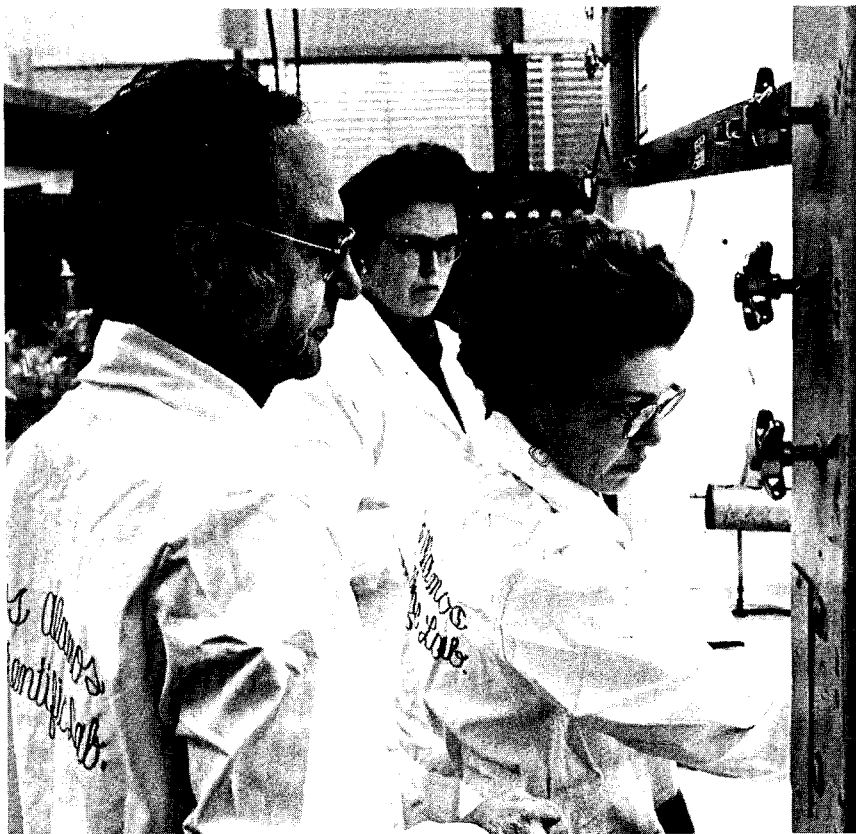
Cosmologists are highly interested in this accomplishment from the standpoint that relative amounts of the isotope can be used as a sort of yardstick to help measure the age of the solar system and other phenomena of our galaxy. Plutonium-244's long half life (80 million years) makes this isotope ideal for such geological measurements.

Naturally occurring plutonium-244 on earth may originate in three different ways. Some of it was made when our solar system was formed and a small fraction of this still exists. It is also believed that it arrives continuously in the form of heavy cosmic rays. A third possible source, and the one that will gain support if calculated amounts of

continued on next page



Darleane Hoffman and Francine Lawrence, both of CNC-11, weigh out a gram of the moon dust from the small vial in which NASA contained the material. The vial and its contents weighed 25.46 grams.



George Cowan, CNC-Division leader, and Mrs. Lawrence observe Mrs. Hoffman weighing the vial of moon dust. The scientists had expected the sample to be amber colored. To their surprise, it is charcoal gray. "It's considered to be a large sample for work in which it is destroyed," Cowan noted.

the isotope are detected in the sample, is that it enters our solar system aboard tiny grains at a rate which varies widely with time as the solar system moves through the galaxy.

Heavy elements such as plutonium are thought to be produced by the interaction of high-density neutrons from exploding stars with lighter nuclei. The atoms then collide with and adhere to the surface of grains, which are presumed to make up about one per cent of the mass in space outside our solar system.

It is thought that grains greater than .2 to .3 microns in diameter may have great enough energy and velocity to penetrate our solar system and eventually fall to earth where they mix with oceanic and terrestrial materials.

According to George Cowan, CNC-Division leader and principal investigator for the moon dust project, if the only plutonium-244 in the world was made at the time the solar system was formed, there would be only about 40 grams of it left. Because it would be thoroughly mixed with the earth's soil, it is much more difficult to find than more recently arrived fallout.

It should be relatively easy, the division leader said, to find recent fallout on the moon's surface which has lain undisturbed for millions of years. Detection of calculated amounts of plutonium-244 in the surface sample would provide supporting evidence that heavy elements in measurable quantities are added to the solar system by grains.

Cowan requested a suitable sample of moon dust from the National

Aeronautics and Space Administration for the experiment. "We were fussy about the kind of sample we wanted," he said. "It had to be as old and undisturbed as possible; it had to come from very close to the surface—preferably no deeper than a centimeter. It should not have been treated in any way for other experiments, and it should be in the form of fine dust rather than rocks because rock surfaces are subject to erosion by the solar wind."

The experiment is being conducted by the same scientists who demonstrated that plutonium-244 exists in measurable quantities in bastnaesite ore. Any plutonium-244 contained in the sample will be chemically isolated by Mrs. Hoffman and Mrs. Lawrence. Measurements will be performed by KAPL mass spectrometrists T. Leo Collins, Jr., Jack Mewherter and Frank Rourke.

Other investigators have looked for the plutonium isotope in both lunar samples from Apollo missions and in terrestrial material, but they were unsuccessful in both areas. Cowan noted that the important difference between the lunar experiment under way at LASL and those previously conducted by other investigators is in the selection of the sample. Samples used in the past were not limited to surface material or may have been too young with respect to near-surface exposure to contain measurable amounts of the isotope.

The moon dust experiment is expected to be completed in six months to a year. In addition to this experiment, Mrs. Hoffman and Mrs. Lawrence are also conducting investigations on other materials. The two scientists are currently looking for plutonium-244 in an African rare-earth material and in a larger sample of organic solvent concentrate from the bastnaesite mine in California. They hope to duplicate their achievement of measuring the isotope in bastnaesite by finding it in other materials to demonstrate in various ways that heavy elements, in measurable amounts surround and enter our solar system.

The Problems with Preservation



National Park Service officials recently discussed preservation problems with scientists at LASL. In photo at left are Bob Cowan, T-4 (foreground); Martin Mayer, supervisor of ruins stabilization at the National Park Service's Arizona Archeology Center; George Catanach, supervisor of cultural properties conservation at the Center; George West, chief of interpretation and visitor services at Bandelier National Monument, near Los Alamos; and Allen Blair, Dir. Off. In photo at right, front to back, are Jack Fullbright, M-1; James Taub, CMB-6 group leader; Austin McGuire, head of LASL's Office of Special Projects; Don Sandstrom, CMB-6 alternate group leader; Steve Newfield, a member of the CMB-6 Plastics Section; and Phil Ehart, head of the Plastics Section.

The Los Alamos Scientific Laboratory's reputation for versatility, established through many years of involvement in a wide range of projects pertaining to both basic research and practical applications, is being earned again. Some of the Laboratory's efforts are now being focused on a tough set of archeological problems posed by the National Park Service.

In response to a request by Park Service officials, LASL scientists are preparing a proposal aimed at a detailed materials and engineering study of historic ruins to determine promising approaches to the development of improved preservation technology.

The proposal is an outgrowth of a meeting at Los Alamos where NPS representatives discussed preservation problems common to the southwestern states and toured facilities where some separate but related work is currently being done for the Park Service.

NPS officials attending the day-long event were George Catanach, supervisor of cultural properties conservation at the Arizona Archeology Center; Martin Mayer, supervisor of ruins stabilization

at the Center; and George West, chief of interpretation and visitor services at Bandelier National Monument, near Los Alamos.

"The National Park Service," Catanach said, "is the federal agency with primary responsibility for the preservation of historic sites, and we're interested in finding better ways to it. Our present methods are somewhat repetitive. When we do some work at a site, two or three years later we may have to go back and do the same work over again. We need improved preservation methods that will be longer lasting."

The supervisor explained that natural elements, such as erosion by wind, water and sun, and seasonal temperature changes, are prime enemies of historic ruins. "As soon as we excavate a site, attrition begins," he said. "Because of the expense and the frequency of repairs, we've throttled down our archeological diggings."

"One of the things we worry about is appearance," added West. "A lot of our efforts now are not aesthetically pleasing."

"In the southwestern states, our biggest prob-

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lem is adobe," said Mayer. "It's made up of diverse materials that vary from site to site, and within materials at the same site. Stabilization methods that work on one type of material don't necessarily work on others.

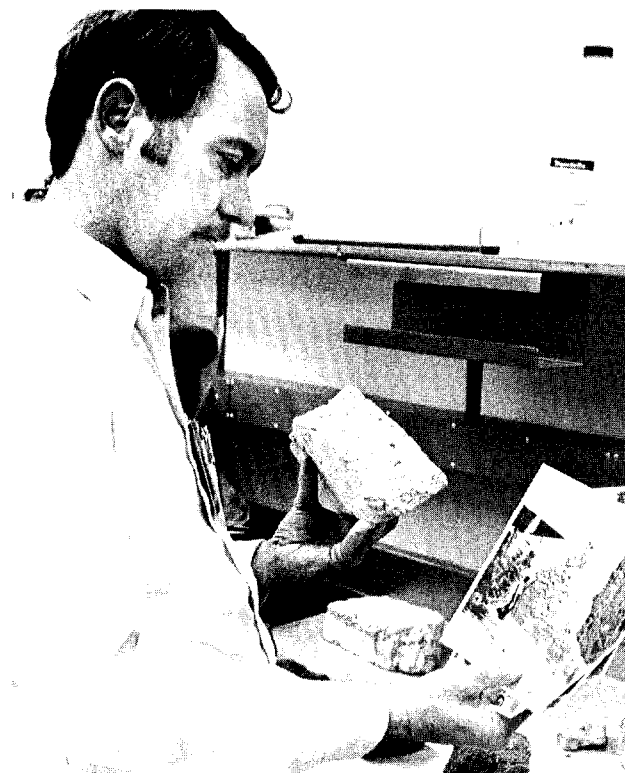
"Casa Grande (Casa Grande Ruins National Monument near Phoenix, Ariz.) is one of our most immediate concerns," Mayer continued. "There are crevices, cracks and faults throughout it. It's been braced extensively and a large metal roof has been built over it to protect it from some of the environmental factors."

The Park Service delegation asked for suggestions on how the Laboratory might do some long-range research to provide improved techniques for the accomplishment of several objectives. Included are methods to determine and restore the integrity of adobe walls without significant change in appearance; to stabilize the foundations of historic structures; and to stabilize and protect adobe surfaces against erosive environmental elements.

"What we want to know," Catanach summarized, "is whether there are methods beyond our technical knowledge that can be used for preserving ruins. If not, can the technology we need be developed over the long haul? How expensive would it be and who would do it? Or, are we asking for something impossible; should we continue to do what we have been doing to preserve our archeological treasures?"

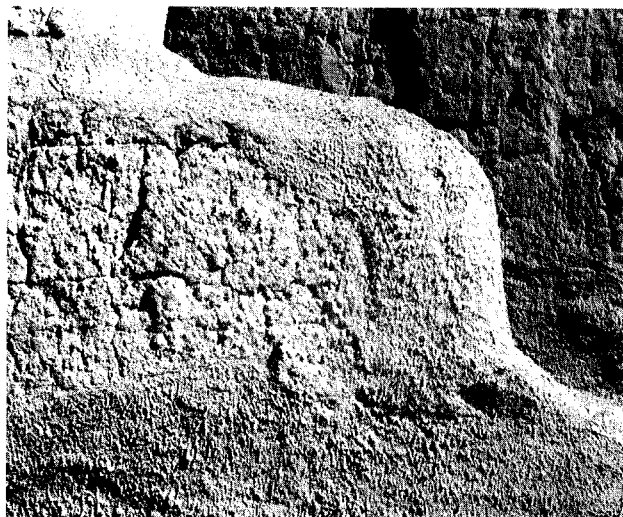
"I think we're interested—It's a challenging set of problems," said James Taub, CMB-6 group leader, who arranged the meeting between NPS and LASL officials, and, who is familiar with some of the problems of preserving historic structures because of an experiment being conducted by two members of his group. These are Steve Stoddard, Ceramics Section leader, and Steve Newfield, a member of the Plastics Section. A colloidal silica coating prepared by Stoddard and an acrylic barrier coating prepared by Newfield were applied to a small section of adobe wall at Casa Grande Ruins National Monument to determine if the preparations would protect adobe surfaces against erosion for long periods of time. Although Mayer reported a slight "whitening" where Newfield applied the coatings, CMB-6 scientists noted that it is yet too early to speculate on the effectiveness of the experiment.

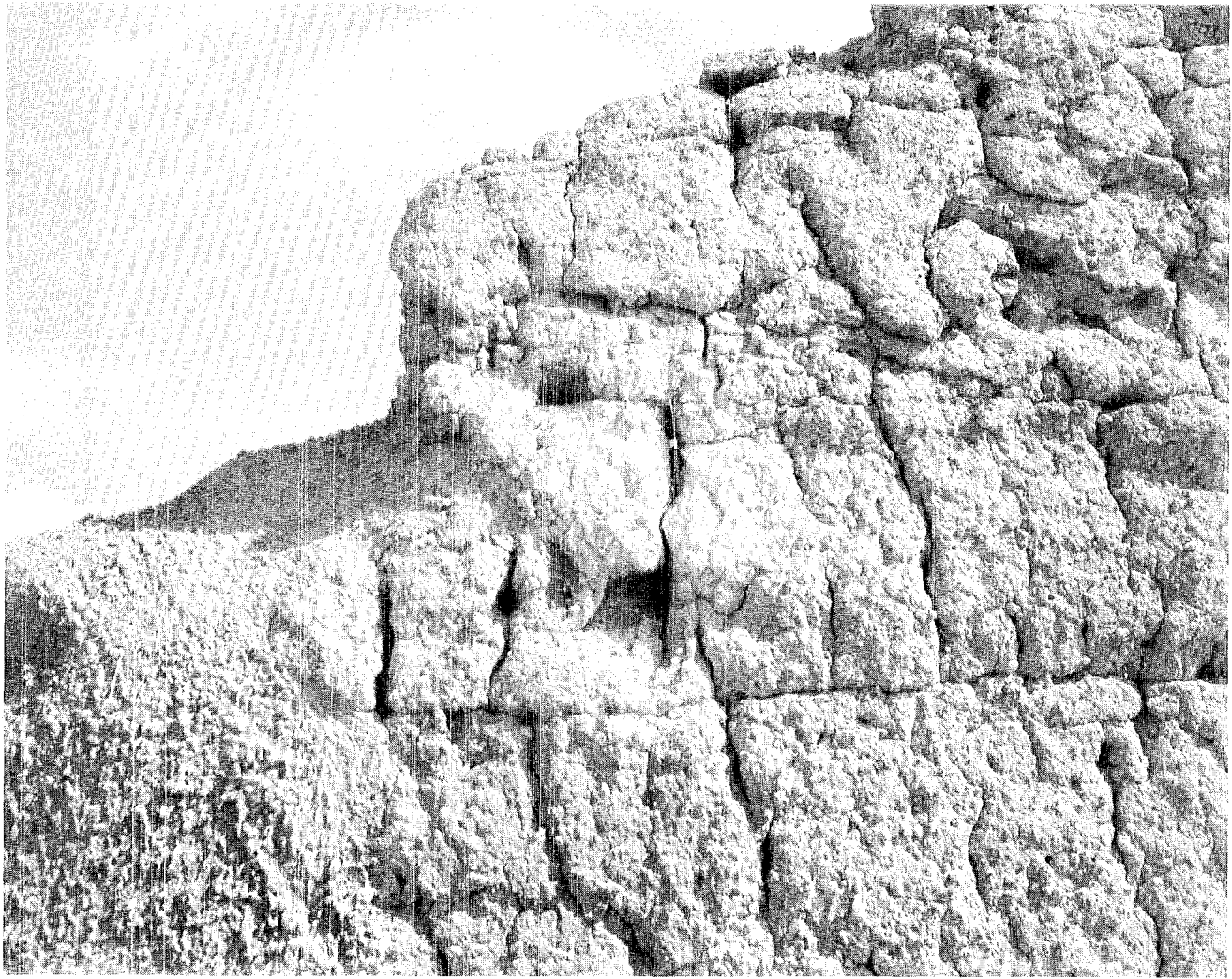
Following the discussion session, the Park Service delegation visited N-7 facilities at the Laboratory where a mobile subterrene is being built that will eventually be loaned to the NPS.



In a CMB-6 Plastics Section laboratory, Newfield shows some samples of adobe from various historic sites and photographs of a wall section at Casa Grande Ruins National Monument. Newfield applied coatings prepared by himself and Steve Stoddard, Ceramics Section leader, to a section of adobe wall at Casa Grande to determine the effectiveness of the preparations in protecting adobe surfaces against erosion.

An acrylic barrier coating prepared by Newfield was applied to a portion (marked by pen at left center) of a section of adobe wall at Casa Grande. Mortar wall cap and base were applied by the National Park Service. (NPS Photograph)





The portion of the wall section where Newfield applied Stoddard's colloidal silica coating is marked by a pen at center. (NPS Photograph)

The subterrene is a rock-melting penetrator being developed at the Laboratory for a seemingly endless list of practical applications. The mobile version is being built with funds from the National Science Foundation.

"With the mobile unit, we'll demonstrate the rock melting principle all over the country," said Joe Neudecker, a member of N-7 who accompanied Park Service representatives on the tour. "After a few weeks on the road, we'll train Park Service personnel in its operation and melt a demonstration hole at some ruins—probably Bandelier. Then, it could be loaned to the Park Service.

"The idea is to melt a horizontal hole from someplace outside a site that will meet with a vertical hole melted inside the site. In this way, water that might otherwise erode historic ruins,

can be drained away and the only evidence is a small hole somewhere within the ruins. What makes the subterrene attractive for doing this is that it's small, portable and vibration free. Vibration from conventional drilling rigs could cause damage to a site."

The mobile unit will represent two milestones in the subterrene program. First of all, use of the unit by the National Park Service will mark the first practical application of a subterrene. All applications to date have been experimental. Secondly, it will bring together in a single package instrumentation that borders on the narrow edge of subterrene technology. It is designed to melt holes two inches in diameter and 100 feet long, parameters equal to experimental achievements to date. The angle of penetration can be

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Joe Neudecker, N-7, shows Catanach, West and Mayer holes melted in rock samples by a subterrene.

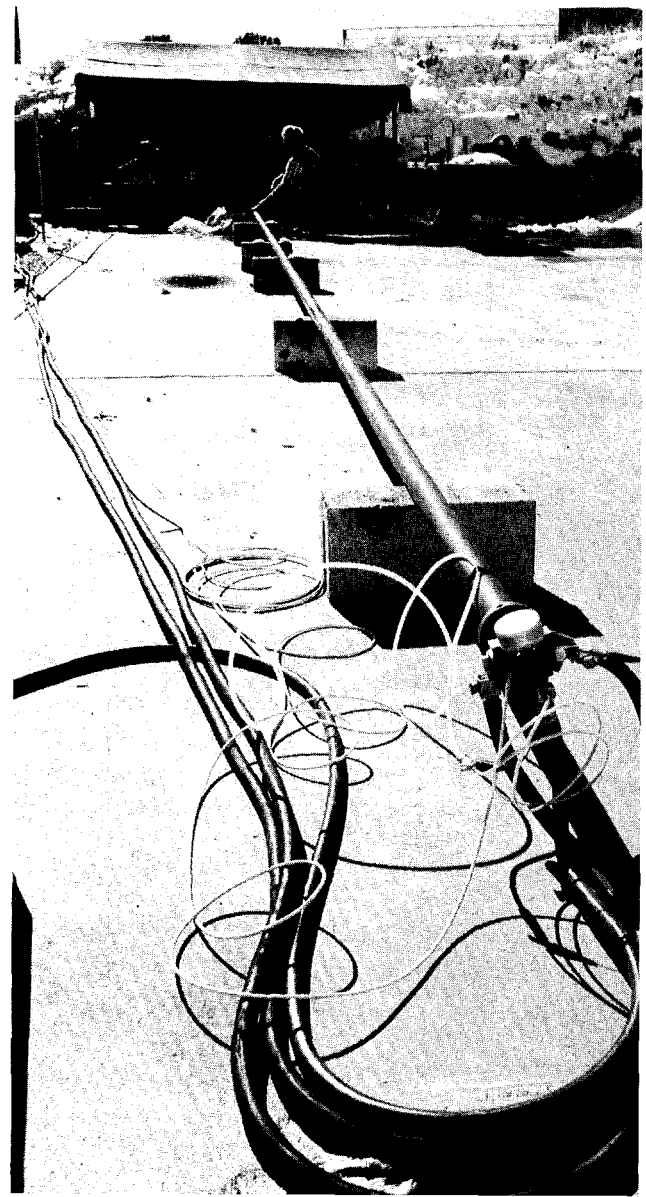
varied from vertical to horizontal. Several vertical experimental holes have been melted at the Laboratory. The first successful horizontal bore—50 feet through a tuff embankment—was melted in December. In addition, the mobile unit will be fitted with the most recently developed types of penetrators. One is a solid penetrator designed to melt through porous rock. With this type, molten materials are forced into voids in the rocks, so there is no debris to be hauled away. Another type of penetrator is hollow. It was designed for boring through dense rock which has few if any voids to accept molten material. Debris, in the form of rock-glass pellets or fine strings of rock wool, is extruded by air pressure through the hollow portion of the penetrator and trailing stem to the surface.

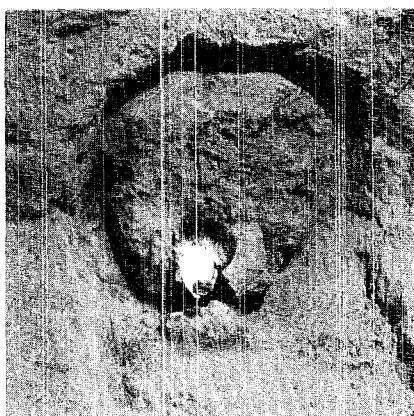
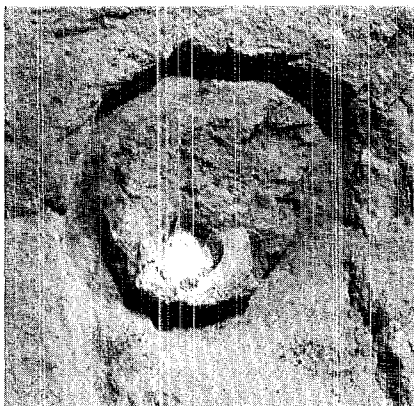
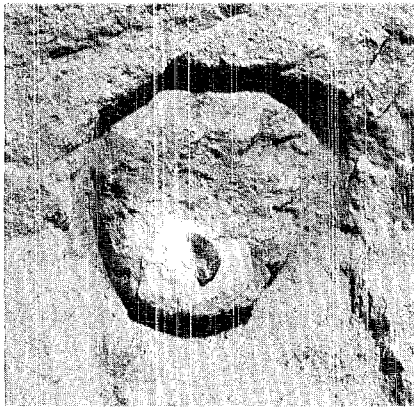
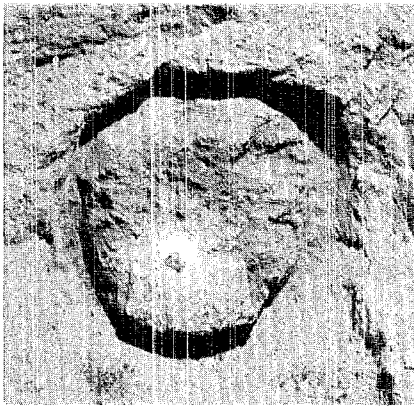
During the course of their visit at the Laboratory, the NPS representatives had invited a team of scientists to visit Casa Grande National Ruins Monument where most of the problems that had been discussed were in evidence. For the purpose of directly viewing these problems, a five-member team from the Laboratory, representing materials, nondestructive testing and engineering disciplines visited the Arizona site. They were Dean Keller, ENG-1; Larry Bryant, M-1; Stoddard and Newfield; and Don Sandstrom, CMB-6 alternate group leader, who coordinated the visit with the National Park Service.

Following this field trip, team members and

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The first horizontal hole melted by a subterrene was through a tuff embankment with this setup. In foreground is the metal stem which trailed the penetrator.





At left, the four-picture sequence shows the subterrene's penetrator breaking through a tuff embankment, culminating the device's first horizontal hole. The hole is two inches in diameter and 50 feet long. Below, John Meissner and Richard Renfro, both of N-7, examine the condition of the penetrator.



Larry Bryant, M-1, explains angle at which adobe from Casa Grande was radiographed to Dean Keller, ENG-1, and Steve Stoddard, CMB-6 Plastics Section leader. In background is radiograph of the adobe.



two other interested scientists—Neudecker and Ben Rogers of M-2—met to bring together individual impressions of problems at Casa Grande and to discuss possible inclusions in the study proposal requested by the National Park Service.

In a report on this meeting, Sandstrom stated:

"The general reaction of all of us who had visited the ruins was one of amazement at the scope of the stabilization required at the site. The value of the ruin as a national resource and archeological treasure is obvious even to the untrained, but the enormity of the stabilization problem is especially obvious to those of us trained in the physical sciences. The personnel of the National Park Service have done an extraordinary job in maintaining the structure at Casa Grande, but they feel that their methods may not represent the best, or most effective techniques for stabilization.

"The general conclusion which we all reached were that two broad categories of problems existed at Casa Grande. These problems are:

- "(1) Structural stabilization for the purpose of assuring safety to visitors to the ruins.
- "(2) Structural stabilization to preserve historical integrity.

"Our collective conclusion regarding the first

problem was that it is perhaps the most pressing one and also the problem which may lend itself to partial solution with techniques presently existent. The second problem involves the stabilization of the actual structural materials via the use of protective coatings which will slow down or prevent the further deterioration of these adobe walls."

Another aftermath of the field trip was the delivery to LASL of some sections of adobe wall from Casa Grande. These sections have been examined to determine some of the adobe's general characteristics. Nondestructive tests by Group M-1 have shown that the interior condition of the adobe is worse than would have been expected from external appearance.

Group ENG-1 may perform compression and shear tests to determine structural characteristics of the material, and N-7 will conduct experiments to determine if a subterrene can be used to bore holes in walls of historic structures for the insertion of reinforcing bars.

Work outlined in the study proposal would probably only involve a few scientists, but it would be spread over a large number of technical groups whose disciplines account for the Laboratory's versatility.



Service Pins Awarded to Nearly 700 LASL Employees

30 Years

Jennings, Hugh, P-9
Putnam, Thomas, MP-DO
Whitson, Robert, SP-DO

25 Years

Aamodt, Rodney, J-DO
Abeyta, Henry, CMB-6
Allen, William, H-2
Anderson, Ernest, H-4
Apodaca, Lawrence, SP-3
Apprill, Gilbert, E-1
Argo, Harold, P-4
Baldridge, John, AO-3
Barber, Glen, J-12
Belcher, Philip, Dir. Off.
Bemis, Edwin, H-1
Blaut, Charles, SD-5
Boggs, Clyde, WX-3
Bond, Curtis, WX-3
Boone, Zenas, M-3
Borkenhagen, Wallace, P-16
Bruce, Wilma, AO-2
Campbell, Robert, J-DO
Carpenter, Robert, CMB-1
Casados, Edward, WX-3
Clancy, Marion, WX-2
Cox, Earl, H-1
Crabtree, Barbara, PER-1
Dallege, Ramona, SP-12
Diven, Benjamin, P-3
Edmonds, James, L-1
Evans, G. Foster, TD-1
Everett, Cornelius, TD-6
Farr, John, CMB-3
Fishbine, Harold, J-10
Flores, Antonia, N-2
Fox, Alvin, CMB-6
Freyman, Robert, E-DOR
Garcia, Ernestine, H-1
Garcia, Gilbert, H-1

Geoffrion, Robert, H-1
Gibbs, Marian, CMB-5
Grilly, Edward, P-8
Haag, William, M-1
Hall, W. Stanley, P-12
Harris, Troy, WX-3
Hasty, Allen, CMB-AP
Hayter, Sidney, CMB-11
Heinze, G. William, SP-4
Hill, James, J-7
Johnson, Allan, AO-6
Jurney, Edward, P-DO
Kelly, Bernice, T-DO
Langenbrunner, Eleanor, SP-2
Langham, Juliamarie, H-4
Lanham, Lloyd, CMB-DO
Lanter, Robert, WX-4
Laquer, Henry, P-8
Lawson, William, WX-3
Leary, Joseph, CMB-DO
Lew, Marion, CMB-1
Lilienthal, James, CMB-DO
Lopez, Felipe, SP-4
Lucero, Herman, SP-4
Luders, Alice, T-9
Lujan, Alfredo, N-7
Lujan, Annie, WX-7
Maraman, William, CMB-11
Marshall, Elisabeth, M-4
Martin, Robert, ISD-7
Martinez, Lydia, T-3
Martinez, Miguel, SP-3
Meyers, Wilbert, WX-7
Milligan, Morris, H-5
Montoya, Frank, SP-3
Montoya, Joe, CNC-4
Neal, Richard, CMB-5
Neher, Leland, J-14
Newbury, Flavil, CMB-14
Newman, Max, SD-3
Ortega, Arturo, SD-1
Osborn, Robert, CMB-6
Osborn, Robert, H-1
Panowski, John, WX-3
Penneman, Robert, CNC-4
Petranto, Joseph, WX-1
Pfaff, Daniel, ENG-2
Phillips, Donald, J-12
Phillips, John, N-5

Porter, Phil, J-8
Powers, Marion, N-1
Quintana, Celestino, J-8
Quintana, Frances, ISD-7
Rendell, Carrol, CMB-11
Rexroth, Verner, Jr., CMB-7
Richards, John, M-1
Riedel, Lee, ISD-7
Rivera, R. Arthur, ISD-5
Romero, Jose, H-1
Romero, Joseph, CMB-11
Rossiter, Frederick, Jr., ENG-4
Rupert, George, CMB-3
Russo, Salvatore, ENG-3
Salazar, Henry, Jr., SP-3
Sanborn, Walter, Jr., SP-12
Sanchez, Jose, SP-3
Sanchez, Lee, WX-3
Schaffer, Joseph, SP-4
Schelberg, Arthur, J-16
Schonsfeld, Fred, CMB-5
Schwartz, Mortimer, WX-3
Simi, Oliver, CMB-1
Southard, Frankie, E-1
Stack, Francis, S-DO
Stovall, Emory, Jr., P-18
Sullivan, John, CNC-4
Suydam, Bergen, T-6
Tafoya, Antonio, SP-3
Tapia, Joe, WX-3
Tapia, Joe, SP-3
Terrell, A. Marjorie, WX-7
Thomas, Olga, CMB-1
Trask, Charles, ENG-2
Travis, Billy, CMB-8
Trujillo, Theodore, H-4
Tucker, John, WX-7
Urizar, Manuel, WX-2
Vandervoort, Raymond, CNC-4
Velasquez, Lucas, WX-3
Vigil, Petasho, CMB-5
Vigil, Tranquilino, SP-4
Watt, Bob, L-2
Wechsler, Jacob, WX-1
Wellnitz, Beverly, TD-4
West, Boyd, AO-DO
Whipple, Harry, H-DO
Winburn, Duane, L-DO

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20 Years

Aldrich, W. Tyler, PER-3
Anstey, Marvin, SD-5
Apgar, Stewart, CMB-11
Apodaca, Joe, SP-3
Aranda, Henry, H-1
Archuleta, Ruben, H-4
Bannerman, Daniel, L-4
Barylski, M. Dorothy, AO-4
Basmann, William, M-2
Bates, Robert, AO-DO
Baxman, Horace, CMB-8
Baytos, John, WX-3
Bell, George, T-DOT
Bendt, Philip, P-12
Benziger, Theodore, WX-2
Bottom, Esther, H-2
Bourne, Naomi, CMB-DO
Brandt, Daniel, SD-1
Brown, Jack, WX-6
Bueschel, Robert, SD-5
Byers, Neale, ENG-2
Case, James, ENG-4
Chavez, Johnny, M-6
Childers, Edra, WX-7
Christensen, Eldon, CMB-11
Clayton, Dwight, SP-2
Coca, Elizabeth, CMB-DO
Cole, Theodore, CMB-7
Conner, Jerry, P-4
Cotter, Theodore, L-DOT
Covington, Eston, ENG-2
Cowan, Helen, TD-3
Cowan, Robert, T-4
Cox, Arthur, J-15
Cox, Loyd, PER-5
Cromer, Don, CMB-5
Devaney, Marjorie, G-7
Diaz, Precilla, ISD-5
Drake, Bonnie, TD-1
Driesner, Allen, N-1
Dropesky, Bruce, CNC-11
Dube, Reginald, M-4
Duhaime, Wilfred, WX-3
Duran, Joe, C-4
Elliott, Reed, CMB-5
Emigh, C. Robert, P-DOR
Esquibel, Ramon, CMB-3
Falkner, Elizabeth, H-2
Ferran, Gilbert, H-5
Fisher, Dale, CMB-6
Frank, Thurman, N-5
Furchner, John, H-4
Gallegos, Mike, E-2
Gay, Hugh, SD-5

Gilbert, Bernie, SD-4
Green, Lewis, WX-3
Greenwood, Arthur, E-3
Griffin, Virgil, ENG-2
Hanson, Raymond, N-4
Hoffman, Marvin, J-12
Holm, Dale, H-6
Israel, Harvey, H-1
Jackson, Armanda, WX-7
Johnson, James, WX-7
Keenan, Thomas, CMB-11
Kelly, Daniel, CMB-1
Kephart, John, L-4
Lamb, Dennis, P-9
Lane, Don, Jr., ENG-2
Lane, Augustabelle, AO-3
Lang, Margaret, T-DO
Lindholm, Glenn, N-7
Lucero, John, AO-3
Lujan, Ismael, WX-1
Lujan, Virginia, ISD-4
Lyon, Buford, J-1
Maestas, Joe, PER-1
Manker, Lawrence, Sr., WX-3
Martinez, Felipe, CMB-AS
Martinez, Fermin, H-1
Martinez, Jose, CMB-AS
Martinez, Jose, H-1
Martinez, Juan, WX-3
Martinez, Pedro, ISD-4
Martinez, Vera, ISD-4
Mascarenas, Joe, CMB-11
Mather, Joseph, P-7
Mayer, James, J-16
Menzel, Mary, T-9
Metropolis, Nicholas, C-DO
Meyer, Clement, CMB-1
Mitchell, Robert, H-5
Mitchell, Victoria, H-4
Montoya, Jose, SP-3
Montoya, Ruben, CMB-6
Mynaugh, Adele, CMB-11
Newell, Evelyn, ISD-3
Nims, Quay, CMB-6
Norwood, Pearl, P-12
Noyes, Horace, SP-DO
O'Rourke, John, CMB-13
Osborn, Lewis, N-2
Pavone, Daniel, CMB-1
Pena, Robert, ISD-7
Pimbley, George, T-DOT
Pizzuto, Vito, SD-5
Price, Relf, Jr., WX-3
Ribe, Fred, P-CTR
Rich, Marvin, T-9
Riggs, Edward, SD-DO
Roach, Frederick, ISD-5
Roach, William, J-10
Rodriguez, Jose, WX-3

Rogers, Benjamin, M-2
Rogers, John, P-8
Rogers, W. LaVerne, MP-1
Romero, Samuel, AO-5
Roybal, Tony, CMB-11
Sanchez, Alfonso, WX-3
Schmitt, Richard, SD-5
Schultz, John, WX-3
Schweitzer, Carol, P-DO
Sherman, Robert, P-8
Shreffler, Robert, Dir. Off.
Shull, Theodore, CNC-11
Simmons, James, P-DOR
Sisneros, Alice, WX-7
Smith, Beatrice, AO-1
Smith, Helen, CNC-11
Smith, Ronald, P-9
Spencer, William, WX-3
Stam, Dorothy, J-10
Stein, Leland, T-3
Steinhaus, David, CMB-1
Stephens, Ward, WX-3
Stoddard, Stephen, CMB-6
Stokes, Richard, P-12
Stratton, William, N-2
Talafoos, Carl, SD-1
Thomson, David, M-6
Thorpe, Munson, A-DO
Tubb, Clarence, SD-5
Tuck, James, P-DO
Tynan, William, SD-5
Van DeVeer, Charles, SD-5
Voorhees, Edward, CADP
Wagner, Robert, N-2
Wallick, Karl, TD-5
Wallis, Malcolm, P-9
Weldon, Joseph, ENG-2
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 Chamberlin, John, C-1
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 Charlton, Charlie, P-16
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 Zaenglein, Conrad, ENG-2
 Zastrow, June, CMB-DO

short subjects

Robert Porton, ISD-2 group leader, began writing "The Atom's" historical column, "20 Years Ago in Los Alamos" in March of 1966.

Through feedback from readers of his column, and some instinct, Porton has recently formed the opinion that items reflecting activities of 10 years ago would recall memories for a greater number of Laboratory employees.

The changeover to "10 Years Ago in Los Alamos" begins with this issue, the first in 1973, of "The Atom."

Students from 50 high schools in a five-state area have been invited to attend the Los Alamos Scientific Laboratory's 14th Science Youth Days April 4-6.

The event is sponsored by the Laboratory in cooperation with the Atomic Energy Commission. Co-chairmen for the event are **Bob Brashear** and **Ken Hill**, both of ISD-2.

According to Brashear, ISD-2 assistant group leader, 700 to 800 students from New Mexico, Colorado, Arizona, California and Texas are expected to participate during the three-day event.

Activities will include lectures on computers, and laser and subterranean research, and tours of seven sites at the Laboratory.

Los Alamos students will participate the first day and have been invited to serve as honor guides for out-of-town students who will tour facilities the following two days.

continued on next page

After leaving the Laboratory to become a private consultant, **William Ogle**, a LASL employee for 28 years and J-Division leader from 1965 until October of last year, received the following letter from **President Nixon**.

Dear Dr. Ogle:

The Nation's nuclear testing program has contributed uniquely to the strength of our national defense and has helped maintain a significant measure of global stability. Our success in achieving test objectives has been aided in a major way by your outstanding services in the nuclear testing program, starting with your early participation in the first TRINITY test and continuing with your assumption of positions of increasing leadership and responsibility since that time.

Your many accomplishments have already been recognized by the Atomic Energy Commission and the Department of Defense. I am pleased to extend my sincere congratulations and the Nation's appreciation for your unique, valued, and lasting contributions.

I know that countless of your colleagues join me in the hope that your retirement will be filled with contentment and satisfaction.

Sincerely,
Richard Nixon



A color transparency of radioactive microspheres, taken by Juliamarie Langham, H-4, won first award in its category in the annual photography contest sponsored by the Biological Photographic Association, Inc.



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The number of persons visiting LASL's Bradbury Science Hall increased by more than 14,000 during 1972, according to ISD-2 Group Leader **Robert Porton**.

Porton reported that 63,571 persons visited the Hall in 1972 compared to 49,561 in 1971. Included in the 1972 figure are 1,134 visitors from foreign countries.



Kathryne Lewis, PER-1, has retired after 13 years with the Laboratory. She will travel for several months before moving to Arizona.

John Bailey, SD-5, a Laboratory employee since 1951 has retired. He and his wife, Anna, will reside in Albuquerque.

William Hoffert, MP-8, retired after working at the Laboratory for six years. He and his wife, Elizabeth, will move to Indiana where he will teach.



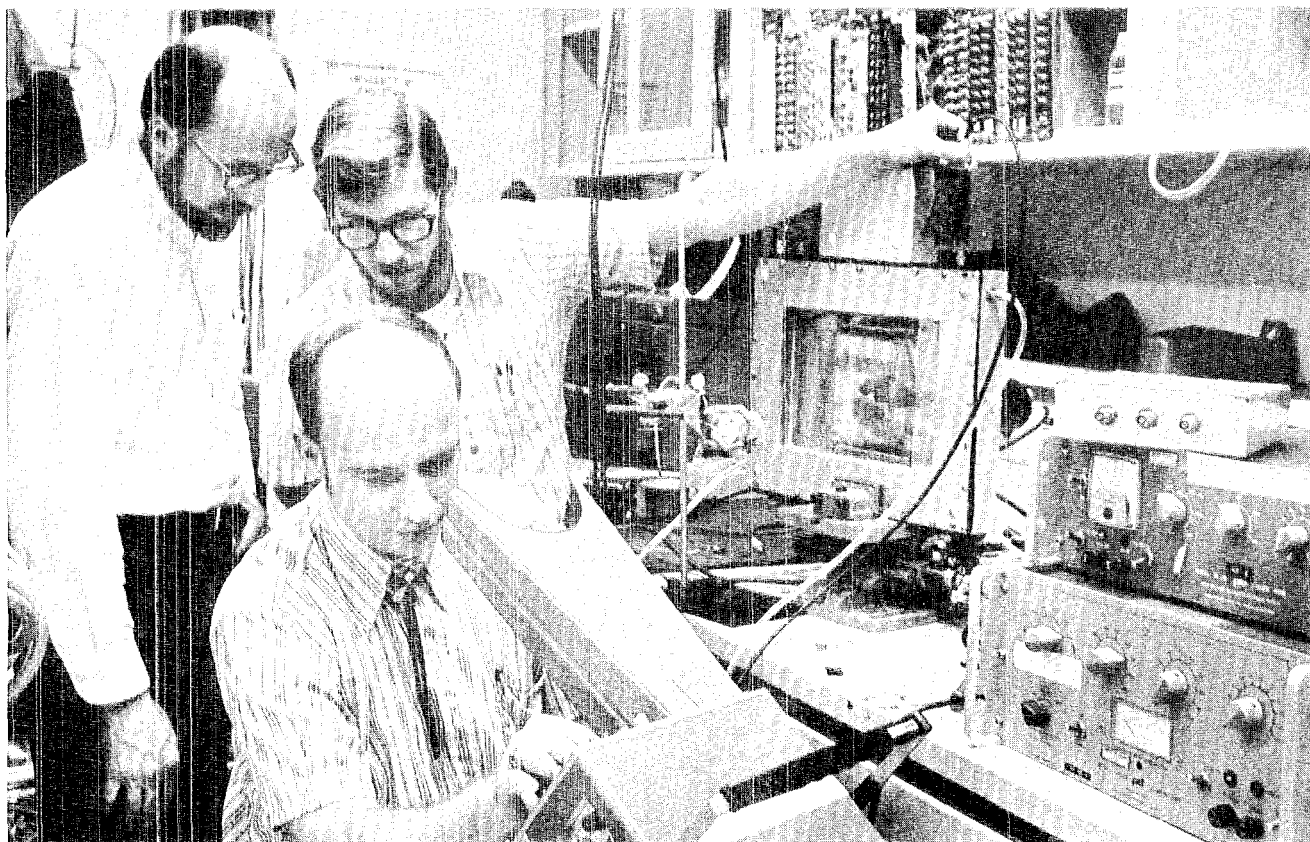
"Distinguished Lectures in Materials Science," a series of lectures to explain the basic similarities and differences in the behavior of materials of different microstructures, is being offered over a four-month period under the joint sponsorship of three universities and three scientific laboratories in New Mexico.

The lectures, scheduled for Thursday evenings, began Jan. 11 and will continue through May 10 at the University of New Mexico Educational Complex Kiva. Sponsors are the University of New Mexico, New Mexico Institute of Technology, New Mexico State University, Sandia Laboratories, Air Force Weapons Laboratory and the Los Alamos Scientific Laboratory.

Purpose of the 18-lecture series is to inaugurate continuing educational programs for materials scientists. Sponsors hope to establish, this spring, a Joint Center for the Study of Materials Science in New Mexico to offer courses, present lectures and engage in research programs intended to increase the level of excellence of scientists already working in materials science fields.

LASL has reserved a block of admissions for interested employees. Persons interested in more detailed information should contact **Fred Schonfeld**, CMB-5.

A New Type of Particle Detector



A new type of particle detector, introduced at the Los Alamos Scientific Laboratory, has handily outdistanced the capabilities of other competitive detector systems. In nuclear physics experiments in which it has been used, the device, known as the Helical Counter, produced more information at a higher rate than any other system in its class, and at drastically reduced cost.

The Helical Counter was designed for use in connection with medium-energy physics experiments at the Los Alamos Scientific Laboratory's Clinton P. Anderson Meson Physics Facility. It was developed by Stan Sobottka, a professor at the University of Virginia; David Lee, a postdoctoral student from the University who is working at the meson facility; Arch Thiessen, MP-7 alternate group

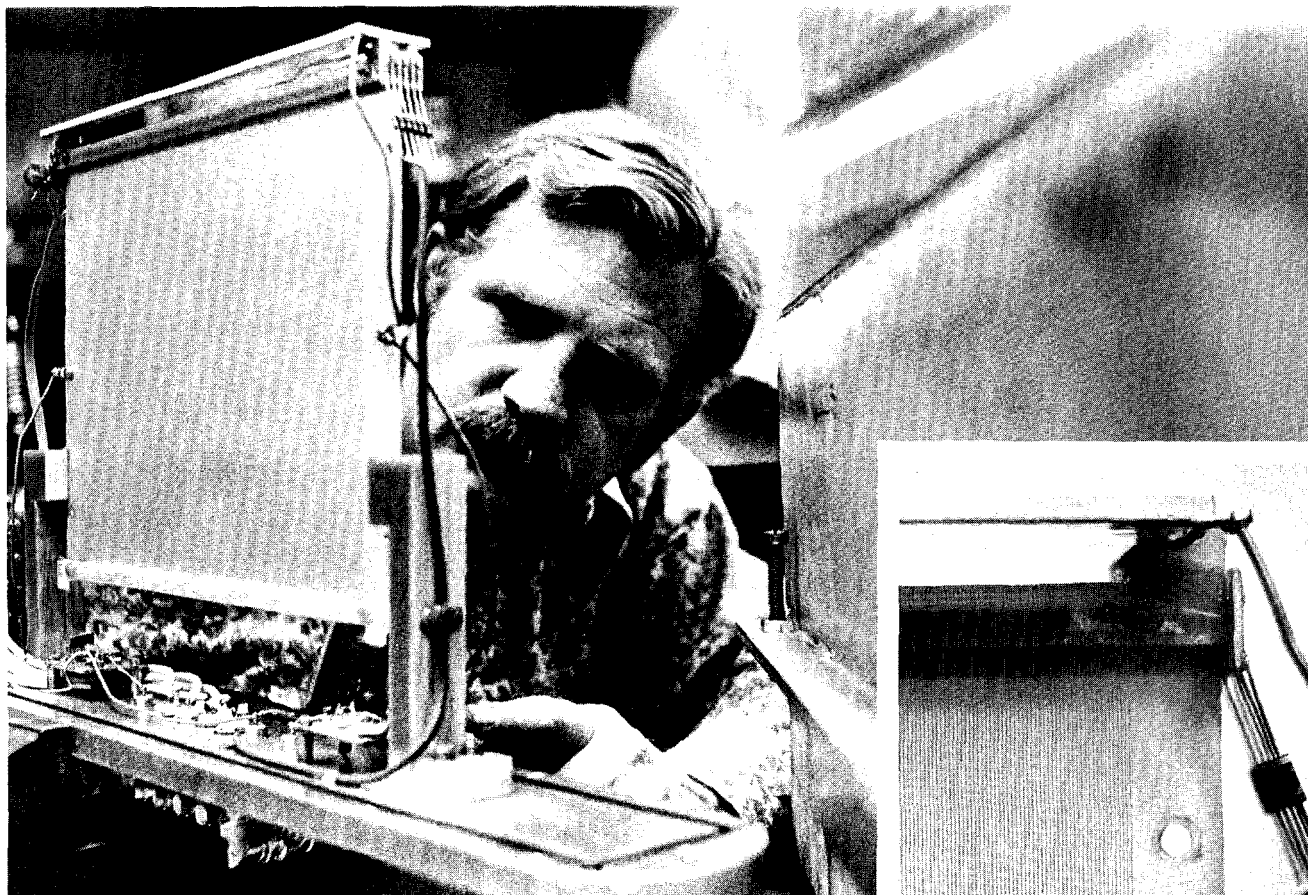
leader; and Charlie Dalton, MP-4. Sobottka and Lee are members of the meson facility's Users Group, which is made up of scientists from throughout the United States and some foreign countries who will share the new accelerator facility with Los Alamos scientists.

The four scientists built the device in anticipation of the requirements of two large spectrometers which are being developed for use with the meson facility's particle accelerator. As the particles pass through the detector, signals pertaining to particle identities, energies and numbers are transmitted to a computer which compiles the information instantaneously. Each of these parameters is related to some property of nuclear structure.

Work on the detector began in 1971. Several models were built and bench tested with particles

Developers of the Helical Counter bench-test a representative model, using particles from a radioactive source. Standing are Stan Sobottka, a professor at the University of Virginia, and David Lee, a postdoctoral student at the University who is working at the Clinton P. Anderson Los Alamos Meson Physics Facility. Seated is Arch Thiessen, MP-7 alternate group leader.

continued on next page



emitted by a radioactive source. "The first good working model was built about a year ago," said Thiesen.

The device is referred to as the Helical Counter because of its key component, a helically wound copper wire through which signals, pertaining to the position of particles within the counter, are transmitted with the speed of light. The signal is transmitted to electronics which count the numbers of particles passing through the counter, and then to a computer which converts position information into energy.

The counter represents a different approach in the design of detector systems. Competitive counters have been built with separate, parallel wires. However, they are extremely expensive, primarily because each of the hundreds of wires required must have its own amplifier and discriminator. Requirements for these electronics are

drastically reduced with the LASL detector.

The new device belongs to a class of detectors known as proportional counters. It is contained in a chamber filled with a gas. Particles entering the chamber interact with the gas and cause an avalanche of electrons to strike positive electrode wires that are strung perpendicular to the direction of the helical winding. A charge induced in the winding is proportional to the energy lost by the particles interacting with the gas. For this reason the detector is called a proportional counter.

"The primary advantage of the system is its accurate resolution," said Lee. "We've been able to get a quarter of a millimeter resolution. That's better than any position sensitive counter to date. There are solid-state detectors with comparable or better resolution, but they're limited by size. Their resolution decreases as size in-

Stuart Orbesen, P-DOR, assembles a Helical Counter for use at the Laboratory's Tandem Van de Graaff Accelerator Laboratory. Insert at lower right shows helical winding.

creases. We need detectors 50 centimeters long. A solid-state detector with the resolution we want can't be made this large.

"Cost is another advantage of our detector. If we didn't have it we would probably use a multi-wire system. The cost would be greater, by a factor of five to 10."

Lee noted that the counter's design is versatile enough that its configuration can be changed to meet a variety of situations. Its versatility has already been proven in at least one instance. Ed Flynn, P-12, and Nelson Stein and Stuart Orbeson, both of P-DOR, became interested in the device for nuclear reaction and particle scattering studies routinely done by members of P-Division. With the assistance of Sobottka, Lee and Thiessen, the counter was modified in order that it could be adapted to P-Division purposes. For the most part, these modifications were necessary because of differences in the energies of particles being studied. The meson facility counter was designed for particles with energies up to 800-million electron volts. The P-Division scientists are interested in particles with energies of 10- to 15-million electron volts.

The modified version was successfully used in its first experiment in July at LASL's Tandem Van de Graaff accelerator. "We found that it not only allows identification of the types of nuclear reaction products" said Flynn, "but the helix is as accurate as the older technique of using photographic emulsions with human scanning, and, most importantly, it gives instantaneous information. With our conventional method it takes days to weeks to get the results of an experiment.

By the conventional method—called the emulsion technique—particles impinge on a photographic plate, leaving tracks that appear in the developed emulsion as a series of closely spaced silver grains. Particle identities, energies and numbers are derived by observing these tracks through a microscope.

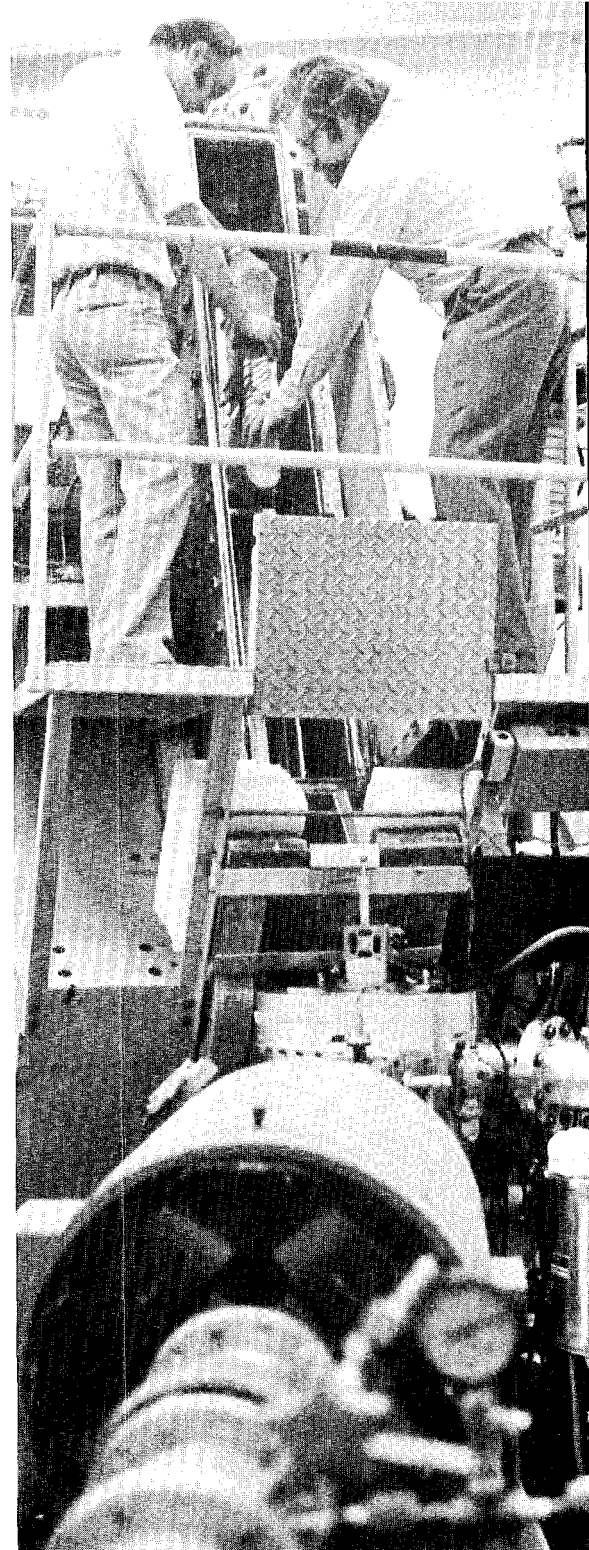
LASL scientists have built ma-

chines to supplement human scanning, one of which was developed by Flynn and Orbeson, that can read a typical plate in about 15 minutes. "In spite of this," Flynn said, "it is impossible with such photographic plates to observe the experiment in progress. One must wait for the development of the plates and the subsequent scanning of events.

"We were ready to use a multi-wire proportional chamber. But a 50-centimeter chamber would have cost us \$20,000. It has parallel wires spaced half a millimeter apart and the electronics for each wire cost about \$20. The new counter has only one wire wound in helical fashion. It's more accurate than the multi-wire system and it only requires two amplifiers for the equivalent of 500 wires in the multi-wire system. In addition it costs much less—\$16,000 to \$18,000 less—and it can be assembled by a skilled technician in a day.

"It also has other advantages. With it, we can do coincidence experiments—measure two things at one time. We can do time of flight measurements and determine when fission products are given off with respect to the time when charged particles go through the counter. It should also allow us to do another class of experiments using heavy ions such as oxygen and carbon."

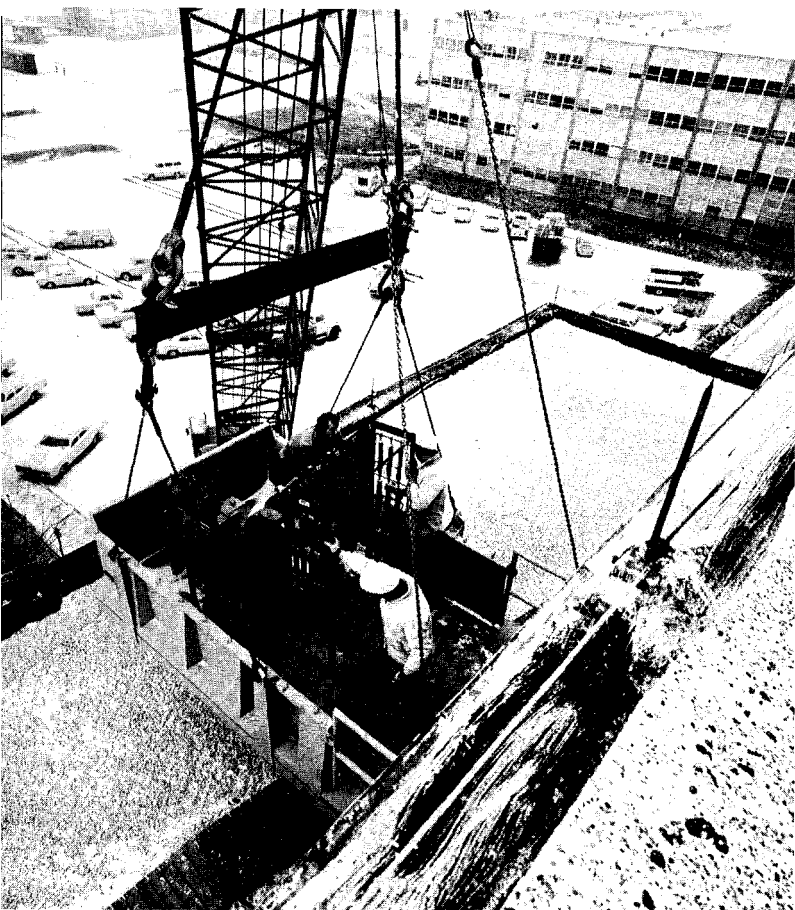
Another area in which the device may have an application, Lee said, is in medicine. Hospital radiography—photography by x-ray radiation—is much the same as the emulsion technique used by P-Division insofar as photographic plates must be developed before a physician can observe damaged or diseased organs, "The counter," Lee said, "can provide a visual representation something like a radiograph. It would show a high count rate where particles are transmitted through the subject and a low count rate where they are not. Its resolution wouldn't be as good as a radiograph, but it would be instantaneous and would save time in emergency cases."



Ed Flynn, P-12, and Nelson Stein, P-DOR, install a Helical Counter in the spectrograph at the Tandem Van de Graaff Accelerator Laboratory at LASL.



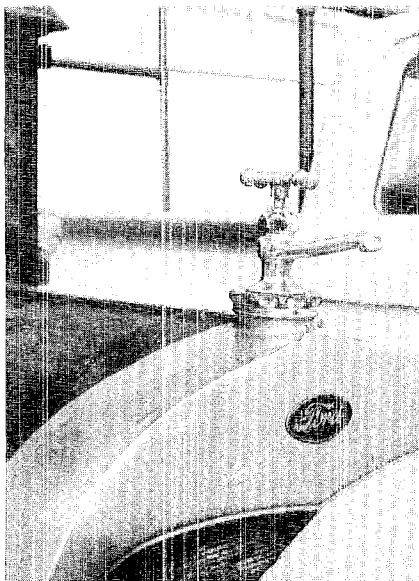
Congressman Manuel Lujan, center, is briefed on Laboratory programs by LASL Director Harold Agnew, left, and Duncan MacDougall, associate director for weapons.



Old switchgear from the Administration Building's East-wing elevator was taken from rooftop to ground by a crane. The crane was also used to transport new components required for the elevator's renovation.

Photo Shorts

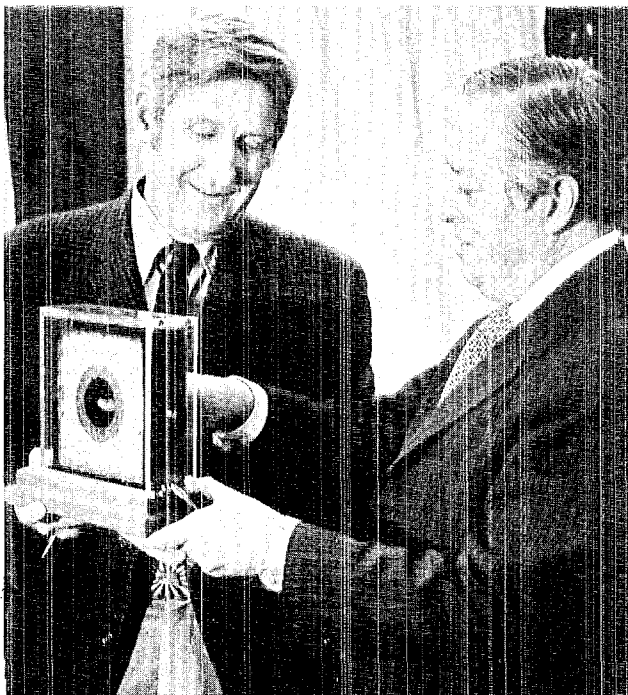
by Bill Jack Rodgers



A faucet—breakthrough in vacuum-cap technology?



The view from Parjarito Mountain was enhanced by recent heavy snows in the Los Alamos area, and the "think snow" people made the most of it.



Director Harold Agnew shows U.S. Senator Joseph Montoya a rock sample with a glass-lined hole which was melted by a subterrene, a thermal penetrator being developed at the Laboratory.

the technical side

Taken from LASL Technical Information Reports submitted through ISD-6

Twenty-Third International Astronautical Congress Special Symposium on Nuclear Power and Propulsion Devices in Space, Vienna, Austria, Oct. 8-15:

"Nuclear Safety in Nuclear Power and Propulsion Devices for Space" by G. A. Graves, Dir. Off. (invited)

1972 Proton Linear Accelerator Conference, Los Alamos, Oct. 10-13:

"RMI Emittance and the LASL LAMPF Beam" by D. W. Mueller, MP-9

"Status of the LAMPF H⁻ Injector" by P. W. Allison, D. W. Mueller, E. A. Meyer, and R. R. Stevens, Jr., all MP-9

Third Symposium on Stored Program Controllers, Los Alamos, Oct. 17-18:

"Real Time Programming System for a Computer-Based Pulse Height Analyzer" by L. V. East, A-1

Scientific Lecture, International Atomic Energy Agency Headquarters, Vienna, Austria, Oct. 18:

"New Potentials in Geothermal Energy" by G. A. Graves, Dir. Off.

New Mexico Section, American Society of Civil Engineers Fall Meeting, Santa Fe, Oct. 27:

"The Merrimac—A 200-Ton Vehicle" by J. D. Allen, ENG-7

Colloquium, High Altitude Observatory, Boulder, Colo., Nov. 2:

"Solar Radio Events and Related Cosmic Ray Effects" by I. D. Palmer, P-4 (invited)

Third International Conference on Trichinellosis, Miami Beach, Fla., Nov. 2-4:

"Physical Methods for Rapid On-Line Detection of Trichinella in Pork" by J. D. Seagrave, P-DOR, and D. M. Holm, H-6

Division of Nuclear Physics, American Physical Society Fall Meeting, Seattle, Wash., Nov. 2-4:

"Angular Correlations of Radiation Emitted from Oriented Nuclei" by K. S. Krane, formerly P-8, R. M. Steffen and R. M. Wheeler, both Purdue University Tandem Laboratory, Ind.

"Nuclear Orientation Studies of the Decays of ^{183,184g,184m}Re" by K. S. Krane, formerly P-8, and W. A. Steyert, P-8

"A New Look in Low-Energy Fission: The Trend toward Mass Symmetry in the Fermium Isotopes" by Darleane Hoffman, CNC-11 (invited)

"Accurate 20-30 Million-Electron-Volts Neutron Flux Measurements" by N. Jarmie, P-DOR, and B. Erkila, P-12

"The Production of K_a and L_a X-Rays by Protons of 1.0 to 3.7 MeV" by R. C. Bearse, visiting staff member in A-1, D. A., Close, J. J. Malanify and C. J. Umbarger, all A-1

"Isotopic Carbon Analysis with Low Energy Protons" by D. A. Close, A. E. Evans, J. J. Malanify, and C. J. Umbarger, all A-1

"Vector Polarization Transfer in D(p, d)H Elastic Scattering" by G. G. Ohlsen, G. C. Salzman, C. K. Mitchell, all P-DOR, D. C. Dodder and J. L. Gammel, both T-9, and Kathleen Witte, C-7

"A Complete Scattering Matrix Determination in Helium-4 (deuteron, deuteron)-Helium-4" by G. C. Salzman, G. G. Ohlsen, C. K. Mitchell, all P-DOR, W. Gruebler, visiting staff member in P-DOR, and W. G. Simon, University of Wyoming, Laramie

"A Detailed Multiple Scattering Calculation of π -Nucleus Scatterings near the 3-3 Resonance" by R. Seki, visiting staff member in T-5

"Two-Neutron Transitions Exciting O⁺ States in the Actinide and Rare Earth Region" by J. D. Garrett, P-DOR (invited)

"Observation of the 7120-keV, 3⁻ → 2₁⁺ Primary Gamma-Ray in ¹⁴⁴Nd" by E. T. Jurney, P-DO, S. Raman, G. G. Slaughter, J. A. Harvey, all Oak Ridge National Laboratory, Tenn., J. C. Wells, Jr., and J. Lin, both Tennessee Technological University, Cookeville, and D. A. McClure, Georgia Institute of Technology, Atlanta

"Polarization Transfer in the Helium-3 (deuteron, proton) Helium-4 Reaction" by R. A. Hardekopf, P-9, D. D. Armstrong, P-12, W. Gruebler, and U. Meyer-Berkhout, both visiting staff members in P-DOR, and P. W. Keaton, Jr., P-DOR

"Polarization Transfer in the D(d, p)T Reaction at 0°" by D. D. Armstrong, P-12, R. A. Hardekopf, P-9, P. W. Keaton, Jr., P-DOR, and T. B. Clegg, visiting staff member in P-DOR

"Possible Excitation of the Parent Analogues of M1 Resonances in the ⁵⁸Ni(t, h)⁵⁸Co Reaction" by E. R. Flynn, P-12, and J. D. Garrett, P-DOR

"Particle-Vibration Coupling States Seen in Inelastic Proton Scattering on the Odd Tin Isotopes" by F. D. Bechetti, Lawrence Livermore Laboratory, Calif., D. G. Fleming, University of British Columbia, Vancouver, and E. R. Flynn, P-12

"Levels of RB-85 from the SR-86 (triton, alpha) Reaction" by R. C. Ragaini, formerly CNC-11, J. D. Knight, CNC-11, and W. T. Leland, L-1

"An R-Matrix Analysis of Reactions in the ¹⁷O System" by G. M. Hale, P. G. Young and D. G. Foster, Jr., all T-2

Rio Grande Chapter, Health Physics Society Fall Meeting, Albuquerque, Nov. 3:

"Non-Uniform Dose Distribution in Tissues: Fact and Fancy" by C. R. Richmond, H-4 (invited)

"Design of Albedo-Neutron Dosimeters" by D. E. Hankins, H-1

Mid-American Chapter, Health Physics Society Meeting, Columbia, Mo., Nov. 4:

"Evaluating the Performance of a Fume Hood" by H. F. Schulte, H-5

Seminar, The Evergreen State College, Olympia, Wash., Nov. 6:

"Los Alamos Programs" by N. Jarmie, P-DOR

Colloquium on New Laser Concepts, Key Largo, Fla., Nov. 8-10:

"Aluminum Fluoride Exploding Wire Laser" by W. W. Rice and R. J. Jensen, both L-3 (invited)

American Society for Cell Biology 12th Annual Meeting, St. Louis, Mo., Nov. 8-11:

"Are Chromosomally Aneuploid Cells Genetically Aneuploid?" by L. L. Deaven and D. F. Petersen, both H-4

"Flow Microfluorometric (FMF) Studies of Plant Lectin Binding to Cultured Mammalian Cells" by P. M. Kraemer, H. A. Crissman and M. A. Van Dilla, all H-4

"A Method for Comparing Effects of Different Synchronizing Protocols on Mammalian Cell-Cycle Traverse" by R. A. Tobey, H. A. Crissman and P. M. Kraemer, all H-4

"The Relationship of Histone Phosphorylation to the Cell Cycle" by L. R. Gurley, R. A. Walters and R. A. Tobey, all H-4

Physics Department Seminar, University of Oregon, Eugene, Nov. 9:

"High Accuracy Charged Particle Cross Section Techniques" by N. Jarmie, P-DOR

Chemistry Department Seminar, University of New Mexico, Albuquerque, Nov. 11:

"Atomic Spectroscopy Research and Some Applications" by D. W. Steinhaus, CMB-1

American Nuclear Society International Winter Meeting, Washington, D.C., Nov. 12-17:

"Performance of a Pellet-to-Pellet Californium-252 Fuel Rod Assay System" by R. A. Forster, H. O. Menlove, J. L. Parker, all A-1, and H. M. Forehand, Jr., summer research assistant in A-1

"Isotopic Neutron Source System for the Assay of Plutonium Rods" by H. O. Menlove, R. A. Forster, J. L. Parker and D. B. Smith, all A-1

"Fissile Assay of Small Samples by Subthreshold Neutron Interrogation" by A. E. Evans, M. M. Thorpe, and J. J. Malanify, all A-1

"Application of the PAD Code to LMFBF Power Transient Studies" by L. B. Engle, W. R. Stratton, and D. M. Peterson, all N-2

"The Pajarito Dynamics Code with Application to Reactor Experiments" by W. R. Stratton, D. M. Peterson and L. B. Engle, all N-2

"Medium and Low Energy Neutron Cross Section Library" by D. R. Harris, T-2, R. G. Fluharty, W-11, J. J. Koelling, ENG-7, and N. L. Whittemore, T-2

"Unified Theory of Multigroup Transport Cross Sections" by D. R. Harris, T-2

"Fusion Reactor Systems" by F. L. Ribe, P-CTR (invited)

"A Tritium-Production Measurement with Application to Fusion Reactor Blanket Design" by D. W. Muir, T-2, and M. E. Wyman, University of Illinois, Urbana

"Radioisotope Production at LAMPF" by L. Rosen, MP-DO, B. J. Dropesky, H. A. O'Brien, Jr., C. J. Orth, all CNC-11, and M. E. Schillaci, MP-3 (invited)

"Effects of Photon Emission Anisotropy on Transport Calculations" by D. J. Dudziak and G. E. Boslor, both T-1

"Neutronic Analysis of a CTR Blanket Benchmark by Discrete Ordinates" by D. J. Dudziak, T-1

"Development of a $^{238}\text{PuO}_2$ Spherical Fuel Form" by M. W. Shupe, formerly CMB-11, R. A. Kent, M. Tokar, R. W. Zocher and T. K. Keenan, all CMB-11 (invited)

"Research on Thermophysical and Thermochemical Properties of Plutonium-238 Oxide Fuels" by R. A. Kent, R. W. Zocher and T. K. Keenan, all CMB-11, and M. W. Shupe, formerly CMB-11

"Neutronic Behavior of the Rover Nuclear Furnace Reactor" by E. A. Plassmann, N-2, and W. U. Geer, FMO

"Helium Migration and Release in $^{238}\text{PuO}_2$ Fuel Forms" by Barbara Mueller, and R. N. R. Mulford, both CMB-5

"Random Source Interrogation System for Non-Destructive Assay of Fissionable Materials" by J. E. Foley, A-1

"Anisotropic Scattering Effects in Reflected Fast Critical Assemblies" by T. J. Hirons, TD-6, and M. E. Battat, T-1

Meeting, Atomic Energy Commission Numerical Analysis Special Interest Groups, Lawrence Livermore Laboratory, Calif., Nov. 13:

"The Truncated Buneman Poisson Solver" by B. L. Buzbee, C-4

"The George Finite Element Program" by F. W. Dorr, C-14

Sixth LAMPF Users Meetings, Los Alamos, Nov. 13-14:

"Status of LAMPF" by L. Rosen, MP-DO

Joint Working Group-20 Meeting, Los Alamos, Nov. 13-16:

"Group-Averaged Reaction Cross Sections in the TD-Division Master Cross Section Library" by D. V. Susco and T. J. Hirons, both TD-6 and P. Whalen, TD-3

Division of Plasma Physics, American Physical Society 14th Annual Meeting, Monterey, Calif., Nov. 13-16:

"Plasma Experiments in the Scyllac Five-Meter Toroidal-Sector Theta Pinch" by W. E. Quinn and W. R. Ellis, both P-15, F. L. Ribe, P-CTR, and C. F. Hammer, P-16

"Measured Plasma Parameters in the Scyllac Toroidal Sector" by W. R. Ellis, F. C. Jahoda and R. E. Siemon, all P-15

"Plasma Experiments on the Scyllac Five-Meter Linear Theta Pinch" by K. S. Thomas, F. C. Jahoda, G. A. Sawyer and R. E. Siemon, all P-15, and H. W. Harris, P-16

"Feedback Stabilization Experiments on the Scylla IV-3 Plasma Column" by S. C. Burnett, R. F. Gribble and C. R. Harder, all P-15, and K. J. Kutac, P-16

"A Reference Fusion Reactor Based on the Theta Pinch" by S. C. Burnett and W. R. Ellis, both P-15,

continued on next page

T. A. Oliphant, Jr., P-18, and F. L. Ribe, P-CTR

"Peak Current and Sheath Velocities for a Coaxial Accelerator" by K. D. Ware, R. A. Gerwin, J. W. Mather and A. H. Williams, all P-7

"Faraday Rotation Measurements on a Dense Plasma Focus" by J. N. Downing, Jr., J. D. Phillips, J. W. Mather and K. D. Ware, all P-7

"Provisional Scaling Laws for Neutrons and X Rays in a Dense Plasma Focus" by R. A. Gerwin, J. W. Mather and K. D. Ware, all P-7

"A 500-kJ, 50-kV Dense Plasma Focus System" by A. H. Williams, D. A. Freiwald, J. W. Mather and K. D. Ware, all P-7

"Multiple-Pass Laser Heating of a Magnetically Confined Plasma" by S. Humphries, Jr., P-14

"Collisional Absorption of Laser Light in an Expanding Plasma" by R. S. Cooper, L-DO

"MHD Stability of Diffuse Toroidal Equilibria" by D. A. Baker and L. W. Mann, both P-18

"Application of the Vlasov-Fluid Model to High-Beta Stability" by H. R. Lewis, P-18

"Collisional Transport of Energetic Electrons in a Radiantly Heated Medium" by C. W. Nielson, P-18, and R. L. Morse, T-6

"Magnetohydrodynamic Stability Properties of a Helically Symmetric L Equals One Pinch" by B. M. Marder and J. P. Freidberg, both P-18, and H. Weitzner, consultant in P-18

"Magnetohydrodynamic Stability Properties of the L Equals Zero Bumpy Pinch" by J. P. Freidberg and B. M. Marder, both P-18, and H. Weitzner, consultant in P-18

"Laser-Driven Implosion of Spherical DT Shells to Thermonuclear Burn Conditions" by R. J. Mason, J. S. Clarke and H. N. Fisher, all TD-8, and R. S. Cooper, L-DO

"Laser Pulse Shapes for Ignition of DT Spheres" by J. S. Clarke, TD-8

"Nonlinear Evolution of Electromagnetic Parametric Instabilities" by E. L. Lindman, J-10, W. D. Forslund, P-18, and J. M. Kindel, T-6

"Inverse Bremsstrahlung Absorption by Optical Resonance in Inhomogeneous Plasma" by M. M. Mueller, L-4

"The LASL 51mm Disc Amplifier" by P. N. Mace and R. C. Hyer, both L-2

"Review of Laser-Induced Fusion" by K. Boyer, L-DO

"Intense Relativistic E-Beams for Laser Pumping" by C. P. Robinson, J. A. Sullivan and R. J. Jensen, all L-3, A. Kolb, N. Rostoker and R. White, all Maxwell Laboratories, Inc., San Diego, Calif.

"High Energy-Short Pulse CO₂ Laser System for Plasma Production" by C. A. Fenstermacher, T. F. Stratton, both L-1, and K. Boyer, L-DO

"Threshold for Onset of Anomalous Microwave Absorption near the Plasma Frequency" by J. C. Ingraham, H. Dreicer and R. F. Ellis, all P-13

"Weak Field Electrical Resistivity Observations near the Electron Plasma Frequency" by H. Dreicer, R. F. Ellis and J. C. Ingraham, all P-13

"Anomalous Microwave Absorption near the Plasma Frequency: Effective Collision Frequency and Electron Heating" by R. F. Ellis, J. C. Ingraham, and H. Dreicer, all P-13

"M.H.D. Stability of the ZT-1 Toroidal Z-Pinch" by A. Haberstich, P-14

"Intra-Cavity Breakdown in CO and CO₂ Laser Systems" by S. D. Rockwood, T-6, G. H. Canavan and W. A. Proctor, both Air Force Weapons Laboratory, Kirtland Air Force Base, Albuquerque

"A Nonlinear Optics Code" by B. R. Suydam and J. C. Goldstein, both T-6, and D. O. Dickman, C-4

"Computer Study of the Saturation of the Weakly-Driven Parametric Decay Instability" by B. Godfrey, T-6

"Plasma Conditioning by UV Preionization in a CO₂ Gas Laser" by O. Judd, T-6, and J. Wada, Hughes Research Laboratories, Malibu, Calif.

"Theoretical Studies of the Electron Beam Controlled CO₂ Laser

for Laser Produced Plasmas" by A. M. Lockett, III, T-6

"Amplitude Modulated Mode-Locking in High Pressure CO₂" by B. J. Feldman, T-6

"A Model for Calculating the Motion of Hot-Electron-Driven Material" by J. Nachamkin, R. L. Morse, both T-6, and C. W. Nielson, P-18

"Collisional Transport of Energetic Electrons in a Radiantly Heated Medium" by R. L. Morse, T-6, and C. W. Nielson, P-18

"Occurrence of High Energy Electrons and Surface Expansion in Radiantly Heated Target Plasmas" by R. L. Morse, T-6, and C. W. Nielson, P-18

"Spectral Measurement of Light Reflected from a Laser Produced Plasma" by G. H. McCall, R. P. Godwin and J. F. Kephart, all L-4

"High-Resolution X-Ray Spectroscopy of Bremsstrahlung from Laser Produced Plasmas" by J. F. Kephart, R. P. Godwin and G. H. McCall, all L-4

"Measured Polarization of X Rays from a Laser Produced Plasma" by R. P. Godwin, J. F. Kephart and G. H. McCall, all L-4

"Collisional Absorption of Light in an Expanding Plasma" by R. S. Cooper, L-DO

"Holographic Interferometry at 10.6 μ m" by P. R. Forman and S. Humphries, Jr., both P-14, and R. W. Peterson, visiting staff member in P-15

"Experimental Results from the ZT-1 Toroidal Pinch" by L. C. Burkhardt, J. N. Di Marco, P. R. Forman, A. Haberstich, H. J. Karr and J. A. Phillips, all P-14

"Calculations of Thermal Conductivity for Dense Plasmas" by N. H. Magee, Jr., and A. L. Merts, both T-4

"Determination of Temperature and Density in Low Temperature Dense Plasmas Using Line to Continuum Intensity Ratios" by A. L. Merts and N. H. Magee, Jr., both T-4

"Calorimeter for Picosecond Laser Pulses" by B. E. Watt, L-2

"A Large Faraday-Effect Optical Isolator" by J. McLeod, D. H. Gill and B. E. Watt, all L-2

"Large Nd: Glass Laser System for Plasma Production" by D. H. Gill, R. C. Hyer, P. N. Mace, J. McLeod, J. E. Perry, Jr., and B. E. Watt, all L-2, and G. H. McCall, L-4

"7B5, 7B6, 7B7 Electromagnetic Instabilities Related to Laser Light Absorption" by J. M. Kindel, T-6 (invited)

"Computer Studies of Diffraction Effects in Lasers" by N. J. Terrell, Jr., T-6

"Electrical Breakdown of Gaseous Media by an Intense Optical Field" by C. J. Elliott, T-6

"Parametric Instabilities Near the Lower Hybrid" by J. M. Kindel, T-6, H. Okuda and J. M. Dawson, both Princeton Plasma Physics Laboratory, N. J.

"Role of Stimulated Backscatter Instabilities in Laser Plasma Irradiation" by J. M. Kindel, T-6, D. W. Forslund, P-18, and E. L. Lindman, J-10

"VUV Emission from a Neon-Seeded Theta Pinch" by D. B. Thomson, M-6, A. G. Bailey, P-16, and R. Engleman, Jr., WX-2

"Model of a Straight Theta Pinch" by W. P. Gula, T-6

"Laser Beam Transport in Fusion Reactors" by D. B. Henderson, L-DOT

"Pulse Propagation in High Pressure CO₂ Laser Amplifiers" by J. C. Goldstein, T-6, and F. A. Hopf, visiting scientist in L-DO

"Temporal Cyclotron Damping—Theory and Simulation" by S. J. Gitomer, visiting staff member in P-18, and D. W. Forslund, T-6

"Parametric Instability of Oblique Collision-Free Shock Waves" by D. W. Forslund and J. M. Kindel, both T-6, and E. L. Lindman, J-10

"Nonlinear Behavior of Backscatter Instabilities in Laser Irradiated Plasmas" by D. W. Forslund and J. M. Kindel, both T-6, and E. L. Lindman, J-10

National Aeronautic and Space Administration Langley Research Center, Hampton, Va., Nov. 15:

"Research on Carbon and Graphite" by R. J. Imprescia, CMB-13

Micrographics Seminar for Atomic Energy Commission Integrated Contractors, Sandia Laboratories, Albuquerque, Nov. 15-16:

"Color Graphics at LASL" by D. O. Dickman, C-4

University of Arizona, Tucson, Nov. 16:

"Neutron Star Matter at Very High Density" by M. Johnson, MP-DO, and H. A. Bethe, Cornell University, Ithaca, N. Y.

Computer Science Department, Stanford University, Calif., Nov. 16:

"The Numerical Solution of Elliptic Partial Differential Equations Using Finite Element Methods" by F. W. Dorr, C-4 (invited)

Plutonium Exchange Meeting, McClellan Air Force Base, Calif., Nov. 16-17:

"Discussion on Outliers" by G. L. Tietjen, C-5

Annual Meeting, Southeastern Section, American Physical Society Session on Medical Physics, Birmingham, Ala., Nov. 17:

"Status and Plans for Pion Radiotherapy at LAMPF" by A. S. Lundy, MP-3 (invited)

Graduate Student Seminar, University of New Mexico, Albuquerque, Nov. 18:

"Applications of the Electron Microprobe to Analysis of Environmental Pollutants" by E. A. Hakilla, CMB-1

Colloquiums, Physics Departments, Utah State University, Logan, Nov. 20; and Montana State University, Bozeman, Nov. 21:

"Computer Creations in Living Color" by M. L. Prueitt, TD-4

Texas Symposium on the Technology of Controlled Thermonuclear Fusion Experiments and the Engineering Aspects of Fusion, Austin, Nov. 20-22:

"The Scyllac MHD Feedback System" by R. F. Gribble, P-15

"Reversible Magnetic Energy Transfer and Storage Systems" by K. I. Thomassen, P-15

"Staged Theta Pinches with Implosion Heating" by F. L. Ribe, P-CTR

"Design Options and Trade-Offs in Superconducting Magnetic Energy Storage with Irreversible Switching" by H. L. Laquer, J. D. G. Lindsay, J. D. Rogers, all P-8, E. M. Little, and D. M. Weldon, both P-15

"Fusion Engineering at the Los Alamos Scientific Laboratory" by E. L. Kemp, P-16

"Neutronic Analysis of a Tritium-Production Integral Experiment" by D. W. Muir, T-2, and M. E. Wyman, University of Illinois, Urbana

"Discrete-Ordinates Neutronic Analysis of a Reference Theta-Pinch Reactor (RTPR)" by D. J. Dudziak, T-1

"Neutron Flux Spectra at LAMPF for CTR Radiation Damage Studies" by D. J. Dudziak, T-1, and M. A. Sherman, CMB-13

"Laser CTR Systems Studies" by J. M. Williams, L-5

"Parameter Study of a Pulsed High-Beta Fusion Reactor" by S. C. Burnett and W. R. Ellis, both P-15, and F. L. Ribe, P-CTR

Second Panel on Neutron Standard Reference Data Meeting, Vienna Austria, Nov. 20-24:

"The ³He(n,p)T, ⁶Li (n, α)T, and ¹⁰B(n, α) Standard Cross Sections" by Leona Stewart, T-2

Third International Atomic Energy Agency Peaceful Nuclear Explosives Meeting, Vienna, Austria, Nov. 26-30:

"Measurements of Neutron Cross Sections with Nuclear Explosives" by B. C. Diven, P-3

Refresher Course, Radiological Society of North America, Chicago, Ill., Nov. 27-30:

"Physical and Radiobiological Aspects of Heavy Charged Particles and their Potential Use in Radiotherapy" by M. R. Raju, H-4 (invited)

10



years ago in los alamos

Culled from January and February, 1963, issues of the LASL News

AEC Chairman Congratulates LASL

The following TWX was received by the Laboratory's director from Glenn Seaborg, chairman of the U.S. Atomic Energy Commission: "On behalf of the Commissioners and the General Manager, I wish to commend you and your staff for outstanding performance in accomplishing Operations Dominic, Nougat and Storax I and II. We congratulate you on a job well done. The knowledge gained is of extreme importance to national defense."

LASL Men Win Cooking Contest

Glory has been brought to Los Alamos. Both first and second places in the New Mexico Section of the 1963 Men's National Cooking Championship have been won by LASL men. "I want to make it clear," Robert Van Gemert said, after his dish "Chicken'n Chips Bake" grabbed off the top title, "I am not out after Virginia Ziebol's job." Second place winner for New Mexico was Vito Pizzuto, SD-1, whose recipe is called simply "Potato Casserole." Van Gemert said that, while he is not at the present time at liberty to divulge the contents of his prize-winning dish, he could say that it did not contain "beverages." In that respect, it differed from most of his other recipes, he said. The cooking contest is sponsored by the Potato Chip Institute of America.

Mercury Moves Toward Permanence

Initial construction was to begin on a \$6-million building and construction program for the Mercury area of Nevada Test Site. Included in the program will be 12 new permanent buildings, utilities and roads, and a 5,000-foot airport runway. The current construction will give Mercury its first permanent facilities. Though Mercury has grown almost continuously throughout its brief history, all new buildings up to now have been of a temporary or semi-permanent wooden-frame type.

Texans Buy Baca Location

A Texas group's purchase of the 100,000-acre Baca Location, adjoining Los Alamos on the west, has started a flurry of rumors that a major recreational development on the order of Idaho's Sun Valley is in the offing. Fate of the projected Valle Grande National Park, which was to have occupied some 30,000 acres in the southeast corner of the huge tract, was uncertain. However, members of the New Mexico congressional delegation were going ahead with legislation in the current session of congress to establish the park, seemingly unworried about the sale.

what's doing

BIEN DICHO TOASTMASTERS CLUB: Luncheon meeting, 12:05 p.m., Mondays, South Mesa Cafeteria. For information call Beverly Wellnitz, 662-4982.

SIERRA CLUB: Luncheon meeting at noon, first Tuesday of each month, South Mesa Cafeteria. For information call Brant Calkin, 455-2468, Santa Fe.

RIO GRANDE RIVER RUNNERS: Meetings scheduled for noon, second Friday of each month at South Mesa Cafeteria. For information call Jon Cross, 662-7521.

LOS ALAMOS SAILORS: Meetings at noon, South Mesa Cafeteria, first Friday of each month. For information call Dick Young, 662-3751.

SPORTS CAR CLUB DEL VALLE RIO GRANDE: Meetings, 7:30 p.m., Hospitality Room, Los Alamos National Bank, first Tuesday of each month. For information call Gerry Strickfadden, 672-3664 or Frank Clinard, 662-4951

PUBLIC SWIMMING: High School Pool—Monday through Wednesday, 7:30 to 9:30 p.m.; Saturday and Sunday, 1 to 5 p.m. Adult Swim Club, Sunday, 7 to 9 p.m.

LOS ALAMOS VOLLEYBALL CLUB: Monday, girls' gym, Los Alamos High School Men—6:30 p.m., women—8:30 p.m. For information call Don Shepard, 662-7865.

LOS ALAMOS OUTDOOR ASSOCIATION: No charge, open to the public. Contact leaders for information.

Jan. 28—Cerro Grande, Faye Brown, 662-2185.

Feb. 17-19—Pecos Wilderness, Bob Mitchell, 672-9292

Feb. 24—Black Mesa, Dibbon Haggard, 662-6209

LOS ALAMOS CONCERT ASSOCIATION: Civic Auditorium, 8:15 p.m.
Feb. 22—Alberto Reyes, pianist

NEWCOMERS CLUB:

Feb. 28, white elephant sale, 7:30 p.m., Hospitality Room, Los Alamos National Bank.

For information call Pat Astle, 662-4709.

MOUNTAIN MIXERS SQUARE DANCING CLUB: Mesa School, 8 p.m. For information call Ruth Maier, 662-3843.

Feb. 3—Jim Dickenson, Los Alamos



Father Ed, "the juvenile beggar," and two boys from Hacienda de los Muchachos, near Springer, N.M., are shown with \$160 in checks. The money, which will be used for operational expenses at the boy's ranch, was contributed to a special Christmas fund by members of Group ISD-7 and presented to Father Ed at a brief ceremony following dinner at the Laboratory's South Mesa Cafeteria.

Henry T. Motz
3147 Woodland
Los Alamos, New Mexico 87544

John Teem, right, recently appointed director of the Atomic Energy Commission's Division of Physical Research, talks with Louis Rosen, MP-Division leader, and Darragh Nagle, alternate MP-Division leader, at the Clinton P. Anderson Los Alamos Meson Physics Facility's main experimental area.

